



Grid Stability

ADVANCED ENERGY
STORAGE, LLC.

The issues

1) Grid challenges

- Renewable energy comes from locations that produce power only intermittently
- As the percentage of power coming from renewable sources increases stability will be impacted
- As loads become mobile (i.e. electric vehicles) the location of demand will become more volatile
- On demand sources, once standard, are now in legislated decline

2) environmental challenges

- Aging infrastructure struggles to handle the grid as interconnected networks vs the grid as pure a distribution model of the past.
- Attracting new manufacturing, cold storage and data warehouses may place high loads in places not equipped to deliver those loads.
- Vehicles will increasingly be a significant component of energy grid demand.

Why energy storage not just the battery

1) Grid challenges

- Growing quantities of energy comes from locations that produce power “when available”
- As loads become mobile (ie electric vehicles) energy demand may become increasingly volatile
- Fuel sources once standard are now in legislated decline

2) environmental challenges

- Current configuration of infrastructure struggles to handle grid as network vs the grid as pure distribution model of old.
- New types of manufacturing place high loads in places that were not originally created for those loads.
- Vehicles are now part of the grid in ever increasing quantities.

Warnings from other States & MI connection.

1) Ford trucks become back up power for Texas

- When the Grid gets too dependent on energy that has reliability issues
- The innovation of Ford and the skills of UAW ease the pain.

2) Environmental events will always impact a perfectly good grid,

- Dry conditions and lack of controlled burns for decades create a California tinderbox
- Advanced Energy Storage creates a product that stores non-flammable energy.
- Creating the ability for power to stay in isolation from the grid.



How do we rate stored energy

1) How long does it last

- We mistakenly focus only on energy density as this provides the smallest foot print.
- What matters more is time in service and initial cost (life cycle cost).

2) What are the cumulative environmental impacts - from acquisition of raw materials through operation and finally to end of life recycle ?

3) Where is it sourced and how “available” are all the materials ?

4) Can it be a PURE MICHIGAN® product, if not what percentage ?



Suggestions

- 1) Add adequate energy storage to the plan as we develop advance energy solutions.
- 2) Use energy storage in the same way a hybrid vehicle does, by making more efficient use of blended energies.
- 3) Use and conserve our current sources of power smartly as we create advanced energy solutions to create the energy blend of tomorrow - whatever that ends up being.
- 4) Work on storage solutions that leverage the skilled trades in Michigan
 - Pipe fitters
 - Electricians
 - Pipe line workers.
 - Welders
 - Machinists



Thank You

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